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# A COMPUTER SYSTEM FOR SCHEDULING FIRE USE

## PART II: COMPUTER TERMINAL OPERATOR'S MANUAL

Larry S. Bradshaw and William C. Fischer

EX LIBRIS  
W. ELLIOTT HORNER



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## RESEARCH SUMMARY

This manual provides program writeups for two separate but related computer programs: RXWTHR and RXBURN. These programs are components of a system designed to aid fire managers in predicting the probable occurrence of desired prescribed fire weather conditions.

The programs are stored in the USDA Forest Service Region 1 shared library at the Fort Collins Computer Center, Colo. They use National Fire Weather Data Data Library climatological data as a basic data source.

Complete information on program features, instructions for use, and program documentation are contained in a separate but related report entitled, "A Computer System for Scheduling Fire Use. Part I: The System" (Bradshaw and Fischer 1981).

# A COMPUTER SYSTEM FOR SCHEDULING FIRE USE PART II: COMPUTER TERMINAL OPERATOR'S MANUAL

Larry S. Bradshaw and William C. Fischer

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# ADP PROGRAM WRITEUP: RXWTHR

## Description

PROGRAM	CSSG*R1LIB.RXWTHR
LANGUAGE	ASCII Standard FORTRAN IV
MACHINE	FCCC UNIVAC 1100
USAGE	BATCH or DEMAND (132 characters)
PROGRAMED	Refer to: Bradshaw, Larry S., and William C. Fischer. 1981. A computer system for scheduling fire use. Part I: The system. USDA For. Serv. Gen. Tech. Rep. INT-91. Intermt. For. and Range Exp. Stn., Ogden, Utah 84401.

## Introduction

This writeup is designed to facilitate use of Program RXWTHR. Program RXWTHR is located in the USDA Forest Service Region 1 shared library of the Fort Collins Computer Center. This program was developed cooperatively by Systems for Environmental Management (SEM) and the Fire in Multiple Use Management Research, Development and Applications Program at the Northern Forest Fire Laboratory, Missoula, Mont. RXWTHR provides climatic summary, and two- and three-way co-occurrence tables from data in the National Fire Weather Data Library (NFWDL). This writeup assumes the user is familiar with data retrieval techniques from the NFWDL. Weather data is read from logical unit 15. If you are not familiar with the data library, get details from Bradshaw and Fischer (1981), or from Furman and Brink (1975). This program may be used in the batch or DEMAND mode. The writeup covers only the batch mode. To run DEMAND, create a run stream via the @DATA and @ADD commands.

## Input

User input to program RXWTHR is structured by (1) directive blocks and (2) information paragraphs. There are from one to five information paragraphs within each directive block. There is one directive block for each station to be analyzed and for each multiple analysis of a single station.

A directive block is always begun by the NUMBER OF STATIONS card and ended with the RUN control card. The NUMBER OF STATIONS card is simply the number of stations (1-99) in card columns 1 and 2. The RUN card is simply the word RUN in columns 1 to 3 on the last card of a directive block.

Information paragraphs within a directive block are set off by a control word and have from one to 15 trailing cards that provide information needed to execute the program. In RXWTHR these paragraphs are:

STATION	information (followed by three information cards)
ACTIVITY	information (followed by one information card)
SUMMARY	information (followed by one to 15 information cards)
CO-OCCUR	information (followed by one to five information cards)
DUFF	information (followed by two to five information cards)

The paragraphs may be entered in any order and are keyed by the capitalized words above beginning with column 1. Information that does not change from one directive block to the next (for multiple analyses) should not be entered in directive blocks following its original declaration.

Information to construct these directive blocks and paragraphs is taken from the User Information sheets provided by program users (exhibit 1). Card punching instructions are contained in exhibits 2, 3, 4, 5, and 6.

## Job Control Language

The following defines the job control language (JCL) needed to get weather data from the National Fire Weather Data Library and execute program RXWTHR. If you do not know the location of the data file for the station to be analyzed, execute the following control commands:

```
@ASG,A FIREDATALIB*PROGRAMS.
@XQT FIREDATALIB*PROGRAMS.LISTFILES
```

Then pick the file that contains the station to be analyzed. If more than one station is to be analyzed, pick the file containing the lowest station number. The following sequence illustrates the JCL to get data and execute RXWTHR for the examples on pages 11-15.

```
1. @RUN,PRIORITY JOBNAME,ACCOUNT,QUALIFIER,TIME,PAGES
2. @ASG,A FIREDATALIB*PROGRAMS.
3. @ASG,A FIREDATALIB*21-24.
4. @USE 2.,FIREDATALIB*21-24.
5. @ASG,UP QUALIFIER*PHILIP.
6. @USE 15.,QUALIFIER*PHILIP.
7. @XQT FIREDATALIB*PROGRAMS.GETDATA2
8.   24020755  24020777 }
9.   24300260  24300277 }
10. @EOF
11. @FREE 2.
12. @ASG,T 2.
13. @ASG,A CSSG*RLLIB.
14. @XQT CSSG*RLLIB.RXWTHR
    two directive blocks go here (see below)
15. @EOF
16. @FIN
```

Note: Actual formats are:

SSSSSSYB SSSSSSYE

SSSSSS = 6 digit station code

YB = Year data to begin

YE = Year data to end

Subsequent analysis of the same station within 6 days would replace commands 2 through 11 with:

```
@ASG,A QUALIFIER*PHILIP.
@USE 15., QUALIFIER*PHILIP.
```

to obtain the same data for analysis from mass storage at FCCC.

## Example of Input Stream for Two-Station Analysis by RXWTHR

02 (Number of Stations)

```
first { STATION
      WEST GLACIER  240207  3200  46 3
      YEARS        1955  1978
      DATES        0601  0915
```



# RXWTHR -- USER INFORMATION SHEET

Total Number Different Stations in This Run \_\_\_\_\_  
 User's Name \_\_\_\_\_, Subunit \_\_\_\_\_, Unit \_\_\_\_\_  
 Project <sup>1/</sup> \_\_\_\_\_

Fire Weather Station Information: Station name \_\_\_\_\_, No. \_\_\_\_\_  
 Elevation \_\_\_\_\_ ft., Latitude \_\_\_\_\_, Climate class <sup>2/</sup> \_\_\_\_\_, Slope class <sup>3/</sup> \_\_\_\_\_  
 Fuel model <sup>4/</sup> \_\_\_\_\_, Last frost <sup>5/</sup> \_\_\_\_\_, Grass type <sup>5/</sup> : annual \_\_\_\_\_, perennial \_\_\_\_\_  
 Year begin \_\_\_\_\_, Year end \_\_\_\_\_, Date begin \_\_\_\_\_, Date end \_\_\_\_\_

Site Adjustment Factors (if any):  
 Aspect \_\_\_\_\_ ( 1=north, 2=east, 3=south, 4=west ), Site elevation \_\_\_\_\_ ft.  
 Canopy cover \_\_\_\_\_ ( 1=open, 2=closed )

Duff/Soil Horizon Information (if Duff Moisture selected. See User's Guide, appendix D):

Layer	Duff/Soil Type	Thickness	
1	_____	_____ cm	1/ Use up to 80 characters
2	_____	_____ cm	2/ See User's Guide, appendix C
3	_____	_____ cm	3/ See User's Guide, appendix B
4	_____	_____ cm	4/ For NFDRS indices only. See User's Guide, appendix A
5	_____	_____ cm	5/ For NFDRS indices only

Summary Table(s) Requested (Select up to 15):

_____ State of the weather	_____ Min relative humidity (24 h, %)
_____ Temperature (degrees F)	_____ Precip duration (last 24 h)
_____ Relative humidity (%)	_____ Precip amount (24 h, 0.01 in)
_____ Wind direction (8 point)	_____ 1 hour fuel moisture (%)
_____ Wind speed (mi/h)	_____ 10 hour fuel moisture (%)
_____ Max temperature (24 h, deg. F)	_____ NFDRS ERC
_____ Min temperature (24 h, deg. F)	_____ NFDRS BI
_____ Max relative humidity (24 h, %)	_____ Duff Moisture (24 h average, %)

Co-occurrence Table(s) Requested (If 2-way table desired leave last space blank. If selected, Wind Direction must always be listed first.):

1 _____ with _____	with _____
2 _____ with _____	with _____
3 _____ with _____	with _____
4 _____ with _____	with _____
5 _____ with _____	with _____

CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol		*Function		PROGRAM NAME RXWTHR	
	D		Duplicate		PROGRAM NUMBER	DATE
	P		Punch		SOURCE DOCUMENT CARD FORM USED	
	S		Skip		PREPARED BY LARRY BRADSHAW	
	V		Verify		PAGE 1 of 2	
L		Left Justify				
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS	
STATION INFORMATION PARAGRAPH *****	1	7	7	P	Punch STATION -- sets up reading sequence of next three cards	
Station Name	1	16	16	P	Format 4A4, enter station name	
Station Number	17	22	6	P	Format I6, enter AFFIRMS number	
Station Elevation	24	28	5	P	Format F5.0, enter elevation (ft)	
Station Latitude	30	31	2	P	Format I2, enter latitude (degrees)	
NFDRS Fuel Model	33	33	1	P	Format A1, enter model	
NFDRS Slope Class	35	35	1	P	Format I1, enter class (1-5)	
Herbaceous Type	37	37	1	P	Format A1, enter A or P	
NFDRS Climate Class	39	39	1	P	Format I1, enter class (1-4)	
Date of Greenup *	41	44	4	P	Format I4, enter MMDD	
REPEAT **	46	46	1	P	Format L1, enter T,F or blank	
SAVE **	48	48	1	P	Format L1, enter T,F or blank	
ADJUST ***	50	50	1	P	Format L1, enter T,F or blank	
Site Aspect Code ***	52	52	1	P	Format I1, enter code (1-4)	
Site Elevation ***	54	58	5	P	Format F5.0, enter elevation	
Site Canopy Cover ***	60	60	1	P	Format I1, enter code (1-2)	
* Needed only for runs with NFDRS INDICES						
** SAVE is used to write first run computation to disk file (TAPE2), next run is then a REPEAT run and reads from TAPE2 skipping first directive block computations.						
***Needed only if site adjustments are to be made. ADJUST turns the option on, the following three items specify adjustments.						

Exhibit 2.--Card punching instructions for RXWTHR Station Information paragraph.

CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol		*Function		PROGRAM NAME RXWTHR	
	D		Duplicate		PROGRAM NUMBER	DATE
	P		Punch		SOURCE DOCUMENT CARD FORM USED	
	S		Skip		PREPARED BY LARRY BRADSHAW	PAGE 2 of 2
V		Verify				
L		Left Justify				
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS	
SECOND CARD AFTER "STATION" CONTROL			CARD			
Years of analysis	1	5	5	P	Punch 'YEARS'	
Beginning year	11	14	4	P	Enter 19YY	
Ending year	17	20	4	P	Enter 19YY	
THIRD CARD AFTER "STATION" CARD						
Dates	1	5	5	P	Punch 'DATES'	
Beginning date	11	14	4	P	Enter MMDD to begin	
Ending date	17	20	4	P	Enter MMDD to end	
*****						
*****						
**** Remember that RXWTHR is limited to a 5-month analysis per execution.						
For analyses of more than 5 months, see page 10 of this report.						

CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol		*Function		PROGRAM NAME RXWTHR	
	D P S V L		Duplicate Punch Skip Verify Left Justify		PROGRAM NUMBER	DATE
					SOURCE DOCUMENT CARD FORM USED	
					PREPARED BY LARRY BRADSHAW	PAGE 1 of 1
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS	
***** *****						
ACTIVITY INFORMATION PARAGRAPH						
ACTIVITY control word (This card is the first card of the paragraph.)	1	8	8	P	Punch ACTIVITY -- this card sets up a reading sequence of one trailing card.	
ACTIVITY information (This is the second and last card of the ACTIVITY paragraph.)	1	80	80	P	Enter any information you wish printed at the top of each page of output. Input format is 20A4.	
***** *****						

Exhibit 3.--Card punching instructions for RXWTHR Activity Information paragraph.



CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol		*Function		PROGRAM NAME RXWTHR		
	D P S V L		Duplicate Punch Skip Verify Left Justify	PROGRAM NUMBER		DATE	
				SOURCE DOCUMENT CARD FORM USED			
				PREPARED BY LARRY BRADSHAW		PAGE <u>1</u> of <u>1</u>	
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS		
***** *****							
SUMMARY INFORMATION PARAGRAPH							
SUMMARY control card	1	7	7	P	Punch SUMMARY -- sets up reading		
(This is the first card					sequence.		
of the paragraph.)							
SUMMARY information	6	25	20	P/L	Punch parameter from user information		
card(s)					sheet. One card per parameter (up to		
					15 cards).		
END paragraph control	1	3	3	P	Punch END -- ends input sequence.		
card (last card of							
paragraph)							
***** *****							

Exhibit 4.--Card punching instructions for RXWTHR Summary Information paragraph.

CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol		*Function		PROGRAM NAME RXWTHR	
	D		Duplicate		PROGRAM NUMBER	DATE
	P		Punch		SOURCE DOCUMENT CARD FORM USED	
	S		Skip		PREPARED BY LARRY BRADSHAW	PAGE 1 of 1
	V		Verify			
	L		Left Justify			
CARD FIELD	COLUMNS		NO. COLS.	FUNC. *	REMARKS	
	FROM	TO				
*****						
*****						
CO-OCCURRENCE INFORMATION	PARAGRAPH					
CO-OCCUR CONTROL CARD	1	8	8	P	Enter CO-OCCUR	
(first card of paragraph)						
CO-OCCUR parameter cards	6	25	20	L/P	Enter first parameter from information	
(up to five)					sheet.	
	31	50	20	L/P	Enter second parameter from information	
(Repeat for each of one					sheet.	
to five tables.)	56	75	20	L/P	Enter third (if requested) parameter	
					from information sheet, otherwise leave	
					blank.	
End Paragraph input	1	3	3	P	Punch END	
sequence last card of						
paragraph						
*****						
*****						

Exhibit 5.--Card punching instructions for RXWTHR Co-occurrence Information paragraph.

CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol	*Function		PROGRAM NAME	
	D	Duplicate		RXWTHR	
	P	Punch		PROGRAM NUMBER	DATE
	S	Skip		SOURCE DOCUMENT CARD FORM USED	
	V	Verify		PREPARED BY	PAGE
L	Left Justify		LARRY BRADSHAW	<u>1</u> of <u>1</u>	
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS
***** *****					
DUFF INFORMATION PARAGRAPH -----					
This paragraph is only entered when the DUFF MOISTURE option is requested in					
either a SUMMARY or CO-OCCUR table information paragraph.					
The paragraph consists of a DUFF control word card that also gives the number of					
layers of duff (NLAYER) and then NLAYER information cards giving the type of duff					
(via code) and the thickness of the layer.					
Card 1. DUFF control	1	4	4	P	Punch DUFF
word and NLAYER	12	12	1	P	Enter number of layers (I1).
DUFF information cards (one for each layer, NLAYER)					
Duff type	1	5	5	P	Punch type code from user information
					sheet. Format is F5.0, decimal is
					punched.
Layer thickness	6	10	5	P	Enter thickness. Format is F5.0,
					decimal is punched, units are centi-
					meters.
***** *****					

Exhibit 6.--Card punching information for RXWTHR Duff Information paragraph.

```

directive {
    ACTIVITY
    BRIEF FIRE WEATHER SUMMARIES FOR WEST GLACIER HEADQUARTERS
}

block {
    SUMMARY
    TEMPERATURE
    WIND DIRECTION
    END
    CO-OCCUR
    WIND DIRECTION          WIND SPEED
    TEMPERATURE             RELATIVE HUMIDITY      WIND SPEED
    END
    RUN
}

02

second {
    STATION
    PHILIPSBURG RS 243002  5280 46 3
}

directive {
    YEARS      1960 1977
    DATES      0501 0931
}

block {
    ACTIVITY
    DEMONSTRATION OF RXWTHR INPUT AND OUTPUT FOR PHILIPSBURG RS
    RUN
}

@EOF

@FIN

```

Exhibits 7 and 8 present user information necessary for this two-station analysis. Output from the second directive block is shown in exhibits 9, 10, 11, and 12.

## Analysis of Stations with More Than Five Months Weather Data by RXWTHR

If two or more runs of RXWTHR are required to obtain a full season analysis, set the NUMBER OF STATION card value to one (01) and stack two or three (if 11 or 12 months of data are available) directive blocks and date of analysis cards (DATES) so that 5 months are covered in the first run. Then set the date of analysis card(s) in the following directive block's (blocks') STATION information sequence so that the entire season is covered in two or three passes through the data. (Setting the NUMBER OF STATION card to 01 rewinds the weather data [Tape 15] after each run [RUN]).



# RXWTHR -- USER INFORMATION SHEET

Total Number Different Stations in This Run 02  
 User's Name COLONY, Subunit GLACIER NP, Unit NPS  
 Project 1/ Brief fire weather summaries for West Glacier headquarters

Fire Weather Station Information: Station name WEST GLACIER, No. 240207  
 Elevation 3200 ft., Latitude 46, Climate class 2/ 3, Slope class 3/  
 Fuel model 4/, Last frost 5/, Grass type 5/: annual \_\_\_\_\_, perennial \_\_\_\_\_  
 Year begin 1955, Year end 1978, Date begin 0601, Date end 0915

Site Adjustment Factors (if any):  
 Aspect \_\_\_\_\_ ( 1=north, 2=east, 3=south, 4=west ), Site elevation \_\_\_\_\_ ft.  
 Canopy cover \_\_\_\_\_ ( 1=open, 2=closed )

Duff/Soil Horizon Information (if Duff Moisture selected. See User's Guide, appendix D):

Layer	Duff/Soil Type	Thickness	
1	_____	_____ cm	1/ Use up to 80 characters
2	_____	_____ cm	2/ See User's Guide, appendix C
3	_____	_____ cm	3/ See User's Guide, appendix B
4	_____	_____ cm	4/ For NFDRS indices only. See User's Guide, appendix A
5	_____	_____ cm	5/ For NFDRS indices only

Summary Table(s) Requested (Select up to 15):

<input type="checkbox"/> State of the weather	<input type="checkbox"/> Min relative humidity (24 h, %)
<input checked="" type="checkbox"/> Temperature (degrees F)	<input type="checkbox"/> Precip duration (last 24 h)
<input type="checkbox"/> Relative humidity (%)	<input type="checkbox"/> Precip amount (24 h, 0.01 in)
<input checked="" type="checkbox"/> Wind direction (8 point)	<input type="checkbox"/> 1 hour fuel moisture (%)
<input type="checkbox"/> Wind speed (mi/h)	<input type="checkbox"/> 10 hour fuel moisture (%)
<input type="checkbox"/> Max temperature (24 h, deg. F)	<input type="checkbox"/> NFDRS ERC
<input type="checkbox"/> Min temperature (24 h, deg. F)	<input type="checkbox"/> NFDRS BI
<input type="checkbox"/> Max relative humidity (24 h, %)	<input type="checkbox"/> Duff Moisture (24 h average, %)

Co-occurrence Table(s) Requested (If 2-way table desired leave last space blank. If selected, Wind Direction must always be listed first.):

1	WIND DIRECTION	with	WIND SPEED	with	_____
2	TEMPERATURE	with	RELATIVE HUMIDITY	with	WIND SPEED
3	_____	with	_____	with	_____
4	_____	with	_____	with	_____
5	_____	with	_____	with	_____

Exhibit 7.--User information for example of two-station analysis, first directive block.

# RXWTHR -- USER INFORMATION SHEET

Total Number Different Stations in This Run 02  
 User's Name BRADSHAW, Subunit FIRE LAB, Unit INT EXP STN  
 Project 1/ Demonstration of RXWTHR output for Philipsburg Ranger Station

Fire Weather Station Information: Station name PHILIPSBURG RS, No. 243002  
 Elevation 5280 ft., Latitude 46, Climate class 2/ 3, Slope class 3/  
 Fuel model 4/, Last frost 5/, Grass type 5/: annual       , perennial         
 Year begin 1960, Year end 1977, Date begin 0501, Date end 0931

Site Adjustment Factors (if any):  
 Aspect        ( 1=north, 2=east, 3=south, 4=west ), Site elevation        ft.  
 Canopy cover        ( 1=open, 2=closed )

Duff/Soil Horizon Information (if Duff Moisture selected. See User's Guide, appendix D):

Layer	Duff/Soil Type	Thickness	
1	<u>      </u>	<u>      </u> cm	***** * 1/ Use up to 80 characters * *****
2	<u>      </u>	<u>      </u> cm	* 2/ See User's Guide, appendix C * *****
3	<u>      </u>	<u>      </u> cm	* 3/ See User's Guide, appendix B * *****
4	<u>      </u>	<u>      </u> cm	* 4/ For NFDRS indices only. See User's Guide, * * appendix A * *****
5	<u>      </u>	<u>      </u> cm	* 5/ For NFDRS indices only * *****

Summary Table(s) Requested (Select up to 15):

<u>      </u> State of the weather	<u>      </u> Min relative humidity (24 h, %)
<u>X</u> Temperature (degrees F)	<u>      </u> Precip duration (last 24 h)
<u>      </u> Relative humidity (%)	<u>      </u> Precip amount (24 h, 0.01 in)
<u>X</u> Wind direction (8 point)	<u>      </u> 1 hour fuel moisture (%)
<u>      </u> Wind speed (mi/h)	<u>      </u> 10 hour fuel moisture (%)
<u>      </u> Max temperature (24 h, deg. F)	<u>      </u> NFDRS ERC
<u>      </u> Min temperature (24 h, deg. F)	<u>      </u> NFDRS BI
<u>      </u> Max relative humidity (24 h, %)	<u>      </u> Duff Moisture (24 h average, %)

Co-occurrence Table(s) Requested (If 2-way table desired leave last space blank. If selected, Wind Direction must always be listed first.):

1	WIND DIRECTION	with	WIND SPEED	with	<u>      </u>
2	TEMPERATURE	with	RELATIVE HUMIDITY	with	WIND SPEED
3	<u>      </u>	with	<u>      </u>	with	<u>      </u>
4	<u>      </u>	with	<u>      </u>	with	<u>      </u>
5	<u>      </u>	with	<u>      </u>	with	<u>      </u>

Exhibit 8.--User information for example of two-station analysis, second directive block.

10 DAY AND MONTHLY SUMMARIES OF \*\*\*TEMPERATURE \*\*\*  
 RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)  
 DEMONSTRATION OF RXWTHR OUTPUT FOR PHILLIPSBURG RANGER STATION  
 PHILLIPSBURG RS (243002) 1960-1977

		TEMPERATURE (F)										N. DAYS	MEAN	SD	MEDIAN	RANGE
PERIOD	BEGINS	BELOW 55	55 TO 59	60 TO 64	65 TO 69	70 TO 74	75 TO 79	80 TO 84	85 TO 89	90 TO 94	95 AND ABOVE					
MAY 1		53.8	12.5	11.5	12.5	2.9	6.7					104	54.3	11.5	52.6	34 - 79
MAY 11		39.4	17.4	14.7	12.8	9.2	6.4					109	57.3	11.0	57.0	30 - 79
MAY 21		31.4	18.5	20.3	12.7	11.0	5.1	.8				118	59.1	10.3	59.0	33 - 84
JUN 1		21.8	14.5	13.5	21.8	15.4	9.1	2.7				110	62.8	9.8	64.0	39 - 82
JUN 11		25.7	15.5	7.3	18.3	13.8	10.1	3.7	4.6			109	63.3	11.8	64.1	34 - 88
JUN 21		13.2	12.3	9.4	15.1	19.8	13.2	12.3	4.7			105	67.7	11.6	69.0	38 - 87
JUL 1		1.4	5.8	5.8	12.3	20.3	29.0	19.6	5.1		.7	138	73.8	8.0	74.8	52 - 95
JUL 11		1.3	5.3	5.7	11.3	15.3	23.3	22.0	11.3	3.3		150	75.1	9.1	75.1	48 - 92
JUL 21		.5	1.2	4.8	8.5	10.9	23.6	29.7	19.4	1.2		165	79.0	7.5	79.1	52 - 90
AUG 1		1.9	4.4	3.8	12.6	15.4	20.1	21.4	15.1	3.8	.5	159	76.4	9.2	76.7	50 - 95
AUG 11		2.1	4.1	5.2	9.6	13.0	19.9	23.3	21.2	.7		146	76.5	9.3	77.8	45 - 91
AUG 21		11.3	8.1	8.1	11.9	13.1	22.5	15.6	6.9	1.9	.5	160	70.8	11.6	73.0	41 - 95
SEP 1		23.1	7.7		15.4	30.8		7.7	7.7	7.7		13	67.4	14.7	69.6	45 - 90
MAY		41.1	15.3	15.7	12.7	7.9	6.0	.3				331	57.0	11.1	56.7	30 - 84
JUN		20.3	14.5	10.2	18.5	15.6	10.8	6.2	3.1			325	64.6	11.3	55.4	34 - 88
JUL		1.1	4.0	5.7	10.6	15.2	25.2	24.1	12.4	1.5	.2	453	75.8	8.4	76.7	48 - 95
AUG		5.2	5.6	5.0	11.4	14.2	20.9	20.0	14.2	2.2	.4	465	74.5	10.5	75.8	41 - 95
SEP		23.1	7.7		15.4	30.8		7.7	7.7	7.7		13	67.4	14.7	69.6	45 - 90

Exhibit 9.--Program RXWTHR temperature summary output for second directive block in two-station analysis example.

10 DAY AND MONTHLY SUMMARIES OF \*\*\*WIND DIRECTION \*\*\*  
 RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)  
 DEMONSTRATION OF RXWTHR OUTPUT FOR PHILLIPSBURG RANGER STATION  
 PHILLIPSBURG RS (243002) 1960-1977

		WIND DIRECTION											
PERIOD	BEGINS	CALM	NE	E	SE	S	SW	W	NW	N		N. DAYS	MODE
-----													
MAY	1	1.9	8.7	1.9	1.9	2.9	26.9	19.2	28.8	7.7		104	NW
MAY	11	1.8	8.3	1.8	1.8	1.8	22.9	20.2	27.5	13.8		109	NW
MAY	21	.8	3.4	.8	2.5	.8	29.7	12.7	38.1	11.0		118	NW
JUN	1	5.5	5.5	3.5	4.5		18.2	14.5	39.1	9.1		110	NW
JUN	11	3.7	1.8	4.5	3.7	1.8	26.6	12.8	30.3	14.7		109	NW
JUN	21	5.7	4.7	2.8	1.9	3.8	25.5	17.9	26.4	11.3		105	NW
JUL	1	2.9	5.8	2.2	2.9	.7	25.4	15.9	29.7	14.5		138	NW
JUL	11	3.3	5.3	2.0	2.0	7.3	22.0	15.3	27.3	15.3		150	NW
JUL	21	1.2	4.8	1.2	2.4	3.0	20.6	20.0	37.6	9.1		165	NW
AUG	1	1.9	9.4	1.3	4.4	1.9	30.2	12.6	30.8	7.5		159	NW
AUG	11	2.7	1.4	1.4	1.4	1.4	28.1	17.8	39.7	6.2		146	NW
AUG	21	2.5	3.8	.5	2.5	9.8	23.1	18.8	32.5	7.5		160	NW
SEP	1					7.7	15.4	46.2	30.8			13	W
-----													
MAY		1.5	5.6	1.5	2.1	1.8	26.6	17.2	31.7	10.9		331	NW
JUN		4.9	4.0	3.7	3.4	1.8	23.4	15.1	32.0	11.7		325	NW
JUL		2.4	5.3	1.8	2.4	3.8	22.5	17.2	31.8	12.8		453	NW
AUG		2.4	4.9	1.1	2.8	4.1	27.1	16.3	34.2	7.1		465	NW
SEP						7.7	15.4	46.2	30.8			13	W

Exhibit 10.--Program RXWTHR wind direction summary output for second directive block in two-station analysis example.

WIND DIRECTION - WIND SPEED

PERCENT FREQUENCY OF CO-OCCURRENCE  
GIVEN TO TENTHS PERCENT

PHILLIPSBURG RS (243002) 1960-1977

DEMONSTRATION OF RXWTHR OUTPUT FOR PHILLIPSBURG RANGER STATION

\*\* MAY \*\*

DIR		WIND SPEED										I	TOTAL	I
		BELOW	3	6	9	12	15	18	21	24	28			
		3	5	8	11	14	17	20	23	27	ABOVE			
CALM	I	1.5										I	1.5	I
NE	I	2.7	1.8	.3	1.2		.3		.3			I	6.6	I
E	I	.3	.6	.3		.3						I	1.5	I
SE	I	.3	.9	.6		.3						I	2.1	I
S	I	.3	.3	.3	.9							I	1.8	I
SW	I	.9	9.7	5.1	4.2	3.6	2.1	.9				I	26.6	I
W	I	1.8	1.8	6.6	2.4	3.6	.9					I	17.2	I
NW	I	1.5	9.4	7.9	4.8	3.6	3.5	.6	.3			I	31.7	I
N	I	.3	1.5	3.3	3.0	1.8	.5	.3				I	10.9	I
TOTAL	I	9.7	26.0	24.5	16.5	13.3	7.5	1.8	.5	0.	0.	I	100.0	I

NUMBER OF DAYS 331

\*\* JUN \*\*

DIR		WIND SPEED										I	TOTAL	I
		BELOW	3	6	9	12	15	18	21	24	28			
		3	5	8	11	14	17	20	23	27	ABOVE			
CALM	I	4.9										I	4.9	I
NE	I	.3	1.8	.6	.9	.3						I	4.0	I
E	I	.3	.9	1.2	.9	.3						I	3.7	I
SE	I	.6	1.2	.6	.3		.5					I	3.4	I
S	I		.9	.3		.6						I	1.8	I
SW	I	4.9	6.5	3.1	4.3	1.8	1.2	1.5				I	23.4	I
W	I	.6	4.6	2.8	3.1	3.7	.3					I	15.1	I
NW	I	2.8	7.7	8.9	6.8	4.9	.5	.3				I	32.0	I
N	I	.3	2.2	4.0	1.5	.9	2.5			.3		I	11.7	I
TOTAL	I	14.8	25.8	21.5	17.8	12.6	5.2	1.8	0.	.3	0.	I	100.0	I

NUMBER OF DAYS 325

Exhibit 11.--Program RXWTHR two-way co-occurrence output (wind direction and windspeed) for second directive block in two-station analysis example.



TEMPERATURE - RELATIVE HUMIDITY - WIND SPEED

PERCENT FREQUENCY OF CO-OCCURRENCE, GIVEN TO TENTHS PERCENT

PHILLIPSBURG RS (243002)  
\*\* MAY \*\* 1960-1977

DEMONSTRATION OF RXWTHR OUTPUT FOR PHILLIPSBURG RANGER STATION

WIND SPEED											LT 6 MPH											WIND SPEED											6 - 11 MPH										
RELATIVE HUMIDITY											RELATIVE HUMIDITY											RELATIVE HUMIDITY											RELATIVE HUMIDITY										
TEMP	BELOW	10	20	30	40	50	60	70	80	90	AND	TEMP	BELOW	10	20	30	40	50	60	70	80	90	AND	TEMP	BELOW	10	20	30	40	50	60	70	80	90	AND								
(F)	10	19	29	39	49	59	69	79	89	ABOVE		(F)	10	19	29	39	49	59	69	79	89	ABOVE		(F)	10	19	29	39	49	59	69	79	89	ABOVE									
LT 55	I			.6	1.5	3.6	1.2	3.3	2.4	3.0	I					.3	1.2	3.3	2.4	3.6	3.0	2.1	.9	I																			
55 - 59	I		.6	.6	2.4	1.2	.6		.3		I			.6	1.2	3.3	1.2	.3	.3				I			.6	1.2	3.3	1.2	.3	.3												
60 - 64	I		.6	1.8	1.8	.6	.3	.3			I			.3	1.5	2.7	.6	.9				I			.3	1.5	2.7	.6	.9														
65 - 69	I		1.2	2.1	.6		.3				I			.6	1.8	1.2	.9				I			.6	1.8	1.2	.9																
70 - 74	I	.6	.9	.6		.3					I			.3	2.1	.9	.3				I			.3	2.1	.9	.3																
75 - 79	I	.3	1.2		.3						I			1.5	1.2	.3					I																						
80 - 84	I	.3									I										I																						
85 - 89	I										I										I																						
90 - 94	I										I										I																						
GE 95	I										I										I																						
TOTAL	I	0.	1.2	4.5	5.7	6.6	5.7	2.4	3.6	2.7	3.0	I	0.	3.3	8.2	9.7	6.3	3.6	3.9	3.0	2.1	.9	I	0.	3.3	8.2	9.7	6.3	3.6	3.9	3.0	2.1	.9	I									

WIND SPEED											12 - 17 MPH											WIND SPEED											18 - 23 MPH										
RELATIVE HUMIDITY											RELATIVE HUMIDITY											RELATIVE HUMIDITY											RELATIVE HUMIDITY										
TEMP	BELOW	10	20	30	40	50	60	70	80	90	AND	TEMP	BELOW	10	20	30	40	50	60	70	80	90	AND	TEMP	BELOW	10	20	30	40	50	60	70	80	90	AND								
(F)	10	19	29	39	49	59	69	79	89	ABOVE		(F)	10	19	29	39	49	59	69	79	89	ABOVE		(F)	10	19	29	39	49	59	69	79	89	ABOVE									
LT 55	I			.9	1.8	.9	1.5	1.2	.9		I					.3	.3		.3	.3		I																					
55 - 59	I		.6	.9	.9	.6	.3				I					.3					I					.3																	
60 - 64	I	.3	.9	1.2	.6		.3	.3			I					.3		.3			I					.3		.3															
65 - 69	I		.9	1.8	.3	.3		.3			I					.3					I					.3																	
70 - 74	I		1.8								I										I																						
75 - 79	I		1.2								I										I																						
80 - 84	I										I										I																						
85 - 89	I										I										I																						
90 - 94	I										I										I																						
GE 95	I										I										I																						
TOTAL	I	.3	0.	5.4	4.8	3.6	1.8	2.1	1.8	.9	0.	I	0.	0.	0.	1.2	.3	.3	.3	.3	0.	0.	I	0.	0.	0.	1.2	.3	.3	.3	.3	0.	0.	I									

WIND SPEED											GE 24 MPH											TOTAL													
RELATIVE HUMIDITY											RELATIVE HUMIDITY											RELATIVE HUMIDITY													
TEMP	BELOW	10	20	30	40	50	60	70	80	90	AND	TEMP	BELOW	10	20	30	40	50	60	70	80	90	AND	TEMP	BELOW	10	20	30	40	50	60	70	80	90	AND
(F)	10	19	29	39	49	59	69	79	89	ABOVE		(F)	10	19	29	39	49	59	69	79	89	ABOVE		(F)	10	19	29	39	49	59	69	79	89	ABOVE	
LT 55	I										I										I														
55 - 59	I										I										I														
60 - 64	I										I										I														
65 - 69	I										I										I														
70 - 74	I										I										I														
75 - 79	I										I										I														
80 - 84	I										I										I														
85 - 89	I										I										I														
90 - 94	I										I										I														
GE 95	I										I										I														
TOTAL	I	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	I	100.0	I	NUMBER OF DAYS	331							I	100.0	I										

Exhibit 12.--Program RXWTHR three-way co-occurrence output (temperature, relative humidity and windspeed) for second directive block in two-station analysis example.

## Error Messages

### 1. Control sequence incorrect, program aborted.

Cause: A control card was read that was uninterpretable by the program's internal dictionary. Misspelled control words or failure to start the word in column 1 of the control card are the most common causes. Can also be caused by not placing an END card at the end of an option series.

### 2. No summary or co-occurrence option specified, program aborted.

Cause: There is neither a SUMMARY nor a CO-OCCUR control card in the input stream.

### 3. Station numbers on descriptor card and data file do not match, program aborted.

Cause: Key punch error on STATION card following STATION control card, or error in data file structure. Remember that stations must be analyzed in ascending order.

### 4. At least one summary option card is incorrect, program aborted.

Cause: One of the option cards trailing the SUMMARY control card is misspelled or does not begin in column 6.

### 5. At least one co-occurrence option card is incorrect, program aborted.

Cause: One of the option cards trailing the CO-OCCUR control card has a misspelled word, or the words do not begin in the correct columns. The correct columns are 6 and 31 for two-way tables, and 6, 31, and 56 for three-way tables.

### 6. Difference between site and AFFIRMS station greater than 2000 feet, no adjustments made.

Cause: When using ADJUST option, elevation differences are limited to 2000 feet. Program executes, but without any site adjustments.

### 7. More than 5 months weather summary requested, only first 5 months processed.

Cause: Self-explanatory -- Split data into two or three sections.

## Output Quantity

For each station, the following output is produced:

SUMMARY tables: One (1) page for each parameter requested.

CO-OCCURRENCE tables:

Two-way: One (1) page for each table per 2-month analysis (for example, a two-way table from May through August will have two pages of output)

Three-way: One (1) page for each table for each month's analysis (for example, a three-way table from May through September will produce five pages of output)

## Cost Estimates

For a typical RXWTHR run (one station, 5-month analysis, five summary tables, two to three co-occurrence tables) a user can expect costs and resource use as outlined below:

<u>Run Priority</u>	<u>Cost</u>	<u>CAU (sec)</u>	<u>Resource time (sec)</u>
DEMAND	\$6.00 - \$7.00	14 - 15	22 - 25
L	\$3.00 - \$4.00	14 - 15	22 - 25
M	\$2.00 - \$3.00	14 - 15	22 - 25
P	\$1.00 - \$2.00	14 - 15	22 - 25

## ADP PROGRAM WRITEUP: RXBURN

### Description

PROGRAM	CSSG*R1LIB.RXBURN
LANGUAGE	ASCII Standard FORTRAN IV
MACHINE	FCCC UNIVAC 1100
USAGE	BATCH or DEMAND (132 characters)
PROGRAMED	Refer to: Bradshaw, Larry S., and William C. Fischer. 1981. A computer system for scheduling fire use. Part I: the system. USDA For. Serv. Gen. Tech. Rep. INT-91. Intermt. For. and Range Exp. Stn., Ogden, Utah 84401.

### Introduction

This writeup is designed to facilitate use of program RXBURN. This program is located in the USDA Forest Service Region 1 shared library at the Fort Collins Computer Center. RXBURN summarizes occurrence frequencies of user-defined prescribed fire conditions. The program operates on data from the National Fire Weather Data Library (NFWDL). This writeup assumes the user is familiar with techniques for accessing this data. Weather data are read from logical unit 15. If you are not familiar with these procedures see Bradshaw and Fischer (1980) or Furman and Brink (1975). This program may be used in either the batch or demand mode. Batch is covered in this writeup. Demand users should create run streams via @DATA and @ADD commands and run programs the same as batch.

### Input

User input to RXBURN is structured by (1) directive blocks and (2) by information paragraphs within the directive blocks. There are from one to five information paragraphs within each directive block. Multiple-station or prescription analysis is obtained by "stacking" directive blocks.

A directive block is set off by a NUMBER OF STATIONS card and ended by a RUN card. The NUMBER OF STATIONS card is simply a card with the number of stations in columns 1 and 2. Up to 99 stations may be analyzed in a single run. The format is I2. The RUN card is simply the word RUN in columns 1 through 3 after all information has been read in the information paragraphs.

Information paragraphs within the directive blocks are set off by a control word beginning in the first column of the card and are followed by from one to 15 information cards, depending on the type of information.

Program RXBURN accepts the following words to set off information paragraphs:

STATION	information (followed by three information cards)
ACTIVITY	information (followed by one information card)
IDENTIFY	information (followed by one information card)
PRESCRIBE	information (followed by one to 15 information cards)
DUFF	information (followed by from two to five information cards)

The paragraphs may be entered in any order within a directive block, and information not changing from one directive block to the next (multiprescription or station analyses) does not need to be reentered in subsequent directive blocks.

Information needed to construct these directive blocks is taken from the user information sheets provided by program users (exhibit 13). Card punching instructions are contained in exhibits 14, 15, 16, 17, and 18.

## Job Control Language

The following defines the job control language (JCL) needed to get weather data from the National Fire Weather Data Library and execute program RXBURN. If you do not know the location of the data file for the station to be analyzed, execute the following control commands:

```
@ASG,A FIREDATALIB*PROGRAMS.  
@XQT FIREDATALIB*PROGRAMS.LISTFILES
```

Then pick the file that contains the station to be analyzed. If more than one station is to be analyzed, pick the file containing the lowest station number. The following sequence illustrates the JCL to get data and execute RXBURN for the examples on pages 27-30.

```
1. @RUN,PRIORITY JOBNAME,ACCOUNT,QUALIFIER,TIME,PAGES  
2. @ASG,A FIREDATALIB*PROGRAMS.  
3. @ASG,A FIREDATALIB*21-24.  
4. @USE 2.,FIREDATALIB*21-24.  
5. @ASG,UP QUALIFIER*PHILIP  
6. @USE 15.,QUALIFIER*PHILIP  
7. @XQT FIREDATALIB*PROGRAMS.GETDATA2  
8. 24300260 24300277  
9. @EOF  
10. @FREE 2.  
11. @ASG,T 2.  
12. @ASG,A CSSG*R1LIB.  
13. @XQT CSSG*R1LIB.RXBURN  
14. @EOF  
15. @FIN
```

Note: Actual formats are:  
SSSSSSYB SSSSSSYE

SSSSSS = 6 digit station code  
YB = Year data to begin  
YE = Year data to end

Subsequent analysis of the same station within six days would replace commands 2 through 11 with:

```
@ASG,A QUALIFIER*PHILIP.  
@USE 15., QUALIFIER*PHILIP.
```

to obtain the same data for analysis from mass storage at FCCC.



# RXBURN -- USER INFORMATION SHEET

Total Number Different Stations in This Run \_\_\_\_\_

User's Name \_\_\_\_\_, Subunit \_\_\_\_\_, Unit \_\_\_\_\_

Project <sup>1/</sup> \_\_\_\_\_

Fire Weather Station Information: Station name \_\_\_\_\_, No. \_\_\_\_\_

Elevation \_\_\_\_\_ ft., Latitude \_\_\_\_\_, Climate class <sup>2/</sup> \_\_\_\_\_, Slope class <sup>3/</sup> \_\_\_\_\_

Fuel model <sup>4/</sup> \_\_\_\_\_, Last frost <sup>5/</sup> \_\_\_\_\_, Grass type <sup>5/</sup> : annual \_\_\_\_\_, perennial \_\_\_\_\_

Year begin \_\_\_\_\_, Year end \_\_\_\_\_, Date begin \_\_\_\_\_, Date end \_\_\_\_\_

Site Adjustment Factors (if any):

Aspect \_\_\_\_\_ ( 1=north, 2=east, 3=south, 4=west ), Site elevation \_\_\_\_\_ ft.

Canopy cover \_\_\_\_\_ ( 1=open, 2=closed )

Duff/Soil Horizon Information (if Duff Moisture selected. See User's Guide, Appendix D):

Layer	Duff/Soil Type	Thickness	
1	_____	_____ cm	***** ** 1/ Use up to 80 characters **
2	_____	_____ cm	** 2/ See User's Guide, appendix C **
3	_____	_____ cm	** 3/ See User's Guide, appendix B **
4	_____	_____ cm	** 4/ For NFDRS indicies only. See User's Guide, ** appendix A
5	_____	_____ cm	** 5/ For NFDRS indices only *****

Prescription Factor Selections (Check and set limits for up to 15 factors.):

Factor	Preferable Rx		Acceptable Rx	
	Minimum	Maximum	Minimum	Maximum
___ State of the weather.....	_____	_____	_____	_____
___ Temperature (deg. F).....	_____	_____	_____	_____
___ Relative humidity (%).....	_____	_____	_____	_____
___ Wind direction (8 point).....	_____	_____	_____	_____
___ Wind speed (mi/h).....	_____	_____	_____	_____
___ Max temperature (24 h, deg. F).....	_____	_____	_____	_____
___ Min temperature (24 h, deg. F).....	_____	_____	_____	_____
___ Max relative humidity (24 h, %).....	_____	_____	_____	_____
___ Min relative humidity (24 h, %).....	_____	_____	_____	_____
___ Days since last precipitation.....	_____	_____	_____	_____
___ Precip amount (24 h, 0.01 in).....	_____	_____	_____	_____
___ 1 hour fuel moisture (%).....	_____	_____	_____	_____
___ 10 hour fuel moisture (%).....	_____	_____	_____	_____
___ NFDRS ERC.....	_____	_____	_____	_____
___ NFDRS BI.....	_____	_____	_____	_____
___ Duff moisture (24 h average, %).....	_____	_____	_____	_____

Exhibit 13.--RXBURN User Information Sheet. User's guide and appendixes A, B, C, and D refer to Bradshaw and Fischer (1981).

CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol		*Function		PROGRAM NAME RXBURN	
	D P S V L		Duplicate Punch Skip Verify Left Justify	PROGRAM NUMBER		DATE
				SOURCE DOCUMENT CARD FORM USED		
				PREPARED BY LARRY BRADSHAW		PAGE 1 of 2
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS	
STATION INFORMATION PARAGRAPH*****	1	7	7	P	Punch STATION -- sets up reading sequence of next three cards	
Station Name	1	16	16	P	Format 4A4, enter station name	
Station Number	17	22	6	P	Format I6, enter AFFIRMS number	
Station Elevation	24	28	5	P	Format F5.0, enter elevation (ft)	
Station Latitude	30	31	2	P	Format I2, enter latitude (degrees)	
NFDRS Fuel Model	33	33	1	P	Format A1, enter model	
NFDRS Slope Class	35	35	1	P	Format I1, enter class (1-5)	
Herbaceous Type	37	37	1	P	Format A1, enter A or P	
NFDRS Climate Class	39	39	1	P	Format I1, enter class (1-4)	
Date of Greenup *	41	44	4	P	Format I4, enter MMDD	
REPEAT **	46	46	1	P	Format L1, enter T,F or blank	
SAVE **	48	48	1	P	Format L1, enter T,F or blank	
ADJUST ***	50	50	1	P	Format L1, enter T,F or blank	
Site Aspect Code ***	52	52	1	P	Format I1, enter code (1-4)	
Site Elevation ***	54	58	5	P	Format F5.0, enter elevation	
Site Canopy Cover ***	60	60	1	P	Format I1, enter code (1-2)	
* Needed only for runs with NFDRS INDICES						
** SAVE is used to write first run computation to disk file (TAPE2), next run is then a REPEAT run and reads from TAPE2 skipping first directive block computations.						
*** Needed only if site adjustments are to be made. ADJUST turns the option on, the following three items specify adjustments.						

Exhibit 14.--Card punching instructions for RXBURN Station Information paragraph.

CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol		*Function		PROGRAM NAME RXBURN	
	D P S V L		Duplicate Punch Skip Verify Left Justify		PROGRAM NUMBER	DATE
					SOURCE DOCUMENT CARD FORM USED	
					PREPARED BY LARRY BRADSHAW	PAGE <u>2</u> of <u>2</u>
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS	
SECOND CARD AFTER "STATION" CONTROL CARD						
Years of analysis	1	5	5	P	Punch 'YEARS'	
Beginning year	11	14	4	P	Enter 19YY	
Ending year	17	20	4	P	Enter 19YY	
THIRD CARD AFTER "STATION" CARD						
Dates	1	5	5	P	Punch 'DATES'	
Beginning date	11	14	4	P	Enter MMDD to begin	
Ending date	17	20	4	P	Enter MMDD to end	
***** *****						



CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol		*Function		PROGRAM NAME RXBURN	
	D		Duplicate		PROGRAM NUMBER	DATE
	P		Punch		SOURCE DOCUMENT CARD FORM USED	
	S		Skip		PREPARED BY LARRY BRADSHAW	PAGE <u>1</u> of <u>1</u>
V		Verify				
L		Left Justify				
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS	
***** *****						
ACTIVITY INFORMATION PARAGRAPH						
ACTIVITY control word	1	8	8	P	Punch ACTIVITY -- this card sets up a	
(this card is the first					reading sequence of one trailing card.	
card of the paragraph)						
ACTIVITY information	1	80	80	P	Enter any information you wish printed	
(this is the second and					at the top of each page of output.	
last card of the ACTIVITY					Input format is 20A4.	
paragraph)						
***** *****						

Exhibit 15.--Card punching instructions for RXBURN Activity Information paragraph.



CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol		*Function		PROGRAM NAME RXBURN	
	D P S V L		Duplicate Punch Skip Verify Left Justify		PROGRAM NUMBER	DATE
					SOURCE DOCUMENT CARD FORM USED	
					PREPARED BY LARRY BRADSHAW	PAGE 1 of 1
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS	
***** *****						
IDENTIFY INFORMATION PARAGRAPH						
Card 1	1	8	8	P	Punch IDENTIFY	
Card 2 information input						
User name	1	20	20	P	Enter user's name	
District	21	40	20	P	Enter district	
Forest	41	60	20	P	Enter forest	
***** *****						

Exhibit 16.--Card punching instructions for RXBURN identify Information paragraph.

CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol		*Function		PROGRAM NAME RXBURN		
	D P S V L		Duplicate Punch Skip Verify Left Justify	PROGRAM NUMBER		DATE	
				SOURCE DOCUMENT CARD FORM USED			
				PREPARED BY LARRY BRADSHAW		PAGE __ of __	
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS		
***** *****							
PRESCRIPTION INFORMATION	PARAGRAPH -- defines prescriptions for program analysis.						
The first card sets up a reading sequence of NPARM trailing cards. NPARM has a value from 1 to 15.							
Card 1. PRESCRIBE -- NPARM 1	9	9	P	Punch PRESCRIBE			
enter NPARM	11	12	2	P	Enter total number of parameters in the		
					prescription. Format I2, right		
					justified.		
Information card(s) -- one for each prescription parameter.							
Parameter	6	30	25	P/L	Enter factor from information sheet.		
Preferred Minimum Value	33	35	3	P	Enter value (right justified)		
Preferred Maximum Value	38	40	3	P	Enter value (right justified)		
Acceptable Minimum Value	43	45	3	P	Enter value (right justified)		
Acceptable Maximum Value	48	50	3	P	Enter value (right justified)		
***** *****							

Exhibit 17.--Card punching instructions for RXBURN Prescriptions Information paragraph.

CARD PUNCHING & VERIFYING INSTRUCTIONS	Symbol		*Function		PROGRAM NAME RXBURN	
	D P S V L		Duplicate Punch Skip Verify Left Justify		PROGRAM NUMBER	DATE
					SOURCE DOCUMENT CARD FORM USED	
					PREPARED BY LARRY BRADSHAW	PAGE 1 of 1
CARD FIELD	COLUMNS FROM TO		NO. COLS.	FUNC. *	REMARKS	
***** *****						
DUFF INFORMATION PARAGRAPH -----						
This paragraph is only entered when the DUFF MOISTURE option is requested as a						
parameter in the PRESCRIPTION information paragraph.						
The paragraph consists of a DUFF control word card that also gives the number						
of layers of duff (NLAYER) and then NLAYER information cards giving the						
type of duff (via code) and the thickness of the layer.						
Card 1. DUFF control	1	4	4	P	Punch DUFF	
word and NLAYER	12	12	1	P	Enter number of layers (I1)	
DUFF information cards (one for each layer, NLAYER)						
Duff type	1	5	5	P	Punch type code from user information	
					sheet. Format is F5.0, decimal is	
					punched.	
Layer Thickness	6	10	5	P	Enter thickness. Format is F5.0,	
					decimal is punched, units are centi-	
					meters.	
***** *****						

Exhibit 18.--Card punching instructions for RXBURN Duff Information paragraph.

## Example of Input Stream for One Prescription

01

STATION

PHILIPSBURG RS 243002 5280 46 3

YEARS 1960 1977

DATES 0510 1101

ACTIVITY

DEMONSTRATION OF RXBURN OUTPUT FOR PHILIPSBURG RANGER STATION

IDENTIFY

LARRY BRADSHAW FIRE LAB MONTANA

PRESCRIBE 03

TEMPERATURE	65	75	60	80
RELATIVE HUMIDITY	20	30	20	55
WIND SPEED	4	9	0	15

RUN

@EOF

@FIN

Exhibit 19 presents user information necessary for this example. Output is shown in exhibits 20, 21, 22, and 23.

## Multiple Prescription Analysis

Program RXBURN is structured such that two or more prescription conditions may be analyzed for frequency of occurrence in one run on the same weather station.

This is accomplished by use of the SAVE and REPEAT options on the station information card in the STATION paragraph. The first directive block stores computed and observed parameter values by setting the SAVE option to TRUE. This is done with a "T" in column 48 of the station information card.

Stored computations are then used in subsequent directive blocks, which does away with the need to reread and compute all data for a station. This is accomplished by a "T" in column 46 of the second directive block. Third and subsequent directive blocks do not need the STATION paragraph entered. Remember, there is one directive block for each prescription analysis.



# RXBURN -- USER INFORMATION SHEET

Total Number Different Stations in This Run 01

User's Name BRADSHAW, Subunit FIRE LAB, Unit INT EXP STN

Project 1/ Demonstration of RXBURN output for Philipsburg Ranger Station

Fire Weather Station Information: Station name Philipsburg RS, No. 243002  
 Elevation 5280 ft., Latitude 46, Climate class 2/ 3, Slope class 3/  
 Fuel model 4/, Last frost 5/, Grass type 5/: annual       , perennial         
 Year begin 1960, Year end 1977, Date begin 0501, Date end 1101

Site Adjustment Factors (if any):

Aspect        ( 1=north, 2=east, 3=south, 4=west ), Site elevation        ft.  
 Canopy cover        ( 1=open, 2=closed )

Duff/Soil Horizon Information (if Duff Moisture selected. See User's Guide, Appendix D):

Layer	Duff/Soil Type	Thickness	
1	<u>      </u>	<u>      </u> cm	1/ Use up to 80 characters
2	<u>      </u>	<u>      </u> cm	2/ See User's Guide, appendix C
3	<u>      </u>	<u>      </u> cm	3/ See User's Guide, appendix B
4	<u>      </u>	<u>      </u> cm	4/ For NFDRS indicies only. See User's Guide, appendix A
5	<u>      </u>	<u>      </u> cm	5/ For NFDRS indices only

Prescription Factor Selections (Check and set limits for up to 15 factors.):

Factor	Preferable Rx		Acceptable Rx	
	Minimum	Maximum	Minimum	Maximum
State of the weather.....				
X Temperature (deg. F).....	65	75	60	80
X Relative humidity (%).....	20	30	20	55
Wind direction (8 point).....				
X Wind speed (mi/h).....	4	9	0	15
Max temperature (24 h, deg. F).....				
Min temperature (24 h, deg. F).....				
Max relative humidity (24 h, %).....				
Min relative humidity (24 h, %).....				
Days since last precipitation.....				
Precip amount (24 h, 0.01 in).....				
1 hour fuel moisture (%).....				
10 hour fuel moisture (%).....				
NFDRS ERC.....				
NFDRS BI.....				
Duff moisture (24 h average, %).....				

Exhibit 19.--User information sheet for one prescription example.

\*\*\*\*\*  
 \* DEMONSTRATION OF RXBURN OUTPUT FOR PHILLIPSBURG RANGER STATION \*  
 \*\*\*\*\*

AFFIRMS STATION NAME: PHILLIPSBURG RS  
 STATION NUMBER: 243002  
 ELEVATION FT MSL: 5280

NATIONAL FOREST: MONTANA  
 DISTRICT: FIRELAB  
 USER: BRADSHAW

YEARS OF WEATHER DATA REQUESTED: 1950 TO 1977 (18 YEARS)  
 SEASONAL DATES OF ANALYSIS : MAY 1 TO NOV 1  
 TOTAL DAYS AVAILABLE : 2215 DAYS OVER 16 YEARS

\*\*\*\*\*  
 \* PRESCRIPTION FACTOR SUMMARY \*  
 \*\*\*\*\*

PRESCRIPTION FACTORS	PREFERABLE CONDITIONS		ACCEPTABLE CONDITIONS	
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
1. TEMPERATURE (DEG F)	65	75	60	80
2. RELATIVE HUMIDITY (%)	20	30	20	55
3. WIND SPEED (MPH)	4	9	0	15

\*\*\*\*\*

\*\*\*\*\*  
 \* PRESCRIPTION OCCURRENCE SUMMARY \*  
 \*\*\*\*\*

	PREFERABLE	ACCEPTABLE	UNACCEPTABLE
DAYS PER SEASON WITHIN PRESCRIPTION (PERCENT)	8 5%	51 37%	80 58%
MONTH OF HIGHEST PRESCRIPTION FREQUENCY (PERCENT PROBABILITY)	SEP 9%	JUL 45%	OCT 71%
10 DAY PERIOD OF HIGHEST RX FREQUENCY BEGINS (PERCENT PROBABILITY)	JUN 1 OCT 1 10%	JUL 1 57%	MAY 1 78%

\*\*\*\*\*

Exhibit 20.--Program RXBURN prescription factor and occurrence summary output for one prescription example.

## PRESCRIPTION OCCURRENCE BY 10 DAY PERIOD AND MONTH

*****												
* MONTH	PERIOD BEGINS	NO. DAYS	** PREFERABLE DAYS			** ACCEPTABLE DAYS			** UNACCEPTABLE DAYS			*
			MEAN	NUMBER	PERCENT	MEAN	NUMBER	PERCENT	MEAN	NUMBER	PERCENT	
*****												
* MAY	1	104	0	5	5%	1	18	17%	5	81	78%	*
* MAY	11	109	0	5	5%	2	33	30%	4	71	55%	*
* MAY	21	119	1	8	7%	3	40	34%	4	70	59%	*
* MAY	TOTAL	331	1	18	5%	6	91	27%	14	222	67%	*
*****												
* JUN	1	110	1	11	10%	3	50	45%	3	49	45%	*
* JUN	11	109	0	4	4%	2	39	35%	4	66	61%	*
* JUN	21	104	0	6	6%	3	45	42%	3	55	52%	*
* JUN	TOTAL	325	1	21	6%	8	134	41%	11	170	52%	*
*****												
* JUL	1	138	0	3	2%	5	78	57%	4	57	41%	*
* JUL	11	150	1	8	5%	4	62	41%	5	80	53%	*
* JUL	21	165	0	5	3%	4	63	38%	6	97	59%	*
* JUL	TOTAL	453	1	16	4%	13	203	45%	15	234	52%	*
*****												
* AUG	1	159	0	7	4%	4	66	42%	5	86	54%	*
* AUG	11	146	0	3	2%	4	56	38%	5	97	60%	*
* AUG	21	160	1	10	6%	4	67	42%	5	83	52%	*
* AUG	TOTAL	465	1	20	4%	12	189	41%	16	256	55%	*
*****												
* SEP	1	137	1	12	9%	3	55	40%	4	70	51%	*
* SEP	11	129	1	11	9%	3	45	35%	5	73	57%	*
* SEP	21	117	1	11	9%	2	39	33%	4	67	57%	*
* SEP	TOTAL	383	2	34	9%	9	139	36%	13	210	55%	*
*****												
* OCT	1	90	1	9	10%	1	20	22%	4	61	68%	*
* OCT	11	90	0	3	3%	1	21	23%	4	66	73%	*
* OCT	21	79	0	0	0%	1	22	28%	4	56	72%	*
* OCT	TOTAL	259	1	12	5%	4	63	24%	11	183	71%	*
*****												
* NOV	TOTAL	0	0	0	0%	0	0	0%	0	0	0%	*
*****												
* TOTAL	TOTAL	2215	8	121	5%	51	819	37%	90	1275	59%	*
*****												

Exhibit 21.--Program RxBURN prescription run length summary output for one prescription example.

## PRESCRIPTION RUN LENGTH SUMMARY

*****													
*****													
* ** PREFERABLE DAY RUNS ** ACCEPTABLE DAY RUNS ** UNACCEPTABLE DAY RUNS *													
* * PERCENTILES * * PERCENTILES * * PERCENTILES *													
* MONTH	PERIOD	MEAN	25TH	MEDIAN	75TH	MEAN	25TH	MEDIAN	75TH	MEAN	25TH	MEDIAN	75TH
*****													
* MAY	1	3	1	1	4	1	1	1	2	4	2	4	7
* MAY	11	1	1	1	1	2	1	2	2	3	1	2	5
* MAY	21	1	1	1	1	2	1	1	2	3	1	2	5
* MAY	TOTAL	1	1	1	1	2	1	1	2	4	1	3	8
*****													
* JUN	1	2	1	1	2	2	1	1	3	2	1	2	3
* JUN	11	1	1	1	1	2	2	2	2	3	1	2	5
* JUN	21	1	1	1	1	2	1	1	2	3	1	2	4
* JUN	TOTAL	1	1	1	1	2	1	2	2	3	1	2	5
*****													
* JUL	1	1	1	1	1	2	1	2	3	2	1	1	2
* JUL	11	1	1	1	1	2	1	1	2	2	1	1	3
* JUL	21	1	1	1	1	2	1	1	2	3	1	2	4
* JUL	TOTAL	1	1	1	1	2	1	1	2	2	1	2	3
*****													
* AUG	1	1	1	1	1	2	1	1	2	2	1	2	3
* AUG	11	1	1	1	1	2	1	1	3	3	1	2	4
* AUG	21	1	1	1	1	2	1	1	2	2	1	2	3
* AUG	TOTAL	1	1	1	1	2	1	1	3	3	1	2	3
*****													
* SEP	1	1	1	1	1	2	1	1	2	2	1	2	2
* SEP	11	1	1	1	1	2	1	2	3	3	1	2	5
* SEP	21	1	1	1	1	2	1	1	2	3	1	2	3
* SEP	TOTAL	1	1	1	1	2	1	1	2	3	1	2	4
*****													
* OCT	1	1	1	1	1	1	1	1	2	3	1	2	4
* OCT	11	2	1	1	2	2	1	1	3	4	2	3	6
* OCT	21	0	0	0	0	2	1	1	2	2	1	1	2
* OCT	TOTAL	1	1	1	1	2	1	1	2	4	1	2	5
*****													
* NOV	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0
*****													

Exhibit 22.--Program RXBURN prescription occurrence by 10-day period and month output for one prescription example.



## PROBABILITY OF MEETING PRESCRIPTION 1, 2, AND 3 DAYS IN THE FUTURE

*****											
* MONTH: MAY *											
TODAYS	*** TOMORROW ***			**** 2 DAYS ****			**** 3 DAYS ****			N DAYS	
COND	PREF	ACCP	UNAC	PREF	ACCP	UNAC	PREF	ACCP	UNAC		
PREF	17%	50%	33%	9%	38%	53%	7%	32%	61%	PREF	18
ACCP	12%	47%	41%	8%	35%	55%	7%	31%	62%	ACCP	85
JNAC	2%	18%	80%	4%	24%	72%	5%	25%	68%	UNAC	215
*****											
* MONTH: JUN *											
TODAYS	*** TOMORROW ***			**** 2 DAYS ****			**** 3 DAYS ****			N DAYS	
COND	PREF	ACCP	UNAC	PREF	ACCP	UNAC	PREF	ACCP	UNAC		
PREF	20%	60%	20%	10%	51%	39%	8%	45%	47%	PREF	20
ACCP	9%	56%	35%	8%	47%	45%	7%	43%	49%	ACCP	132
JNAC	3%	28%	69%	5%	37%	58%	6%	40%	54%	UNAC	173
*****											
* MONTH: JUL *											
TODAYS	*** TOMORROW ***			**** 2 DAYS ****			**** 3 DAYS ****			N DAYS	
COND	PREF	ACCP	UNAC	PREF	ACCP	UNAC	PREF	ACCP	UNAC		
PREF	0%	75%	25%	4%	48%	48%	4%	45%	51%	PREF	16
ACCP	4%	52%	44%	4%	46%	51%	4%	45%	52%	ACCP	206
JNAC	3%	36%	61%	3%	43%	54%	4%	44%	52%	UNAC	227
*****											

Exhibit 23.--Program RXBURN probability of meeting prescription in the future output for one prescription example.

This option has one restriction: parameters not computed in the first directive block will not be available for analysis in subsequent blocks. This applies only to National Fire Danger Rating System (NFDRS) indices, fuel moisture values, and duff moisture computations. Fuel moisture is computed if either fuel moisture or an NFDRS index is requested. NFDRS indices and duff moisture are computed only when requested. NFDRS fuel models and site adjustments cannot, therefore, be altered after the initial directive block. The following example shows how to analyze four prescriptions at the same station. The site adjustment option is used in this example.

## Example of Multiple Prescription Analysis

```
card columns
      1      2      3      4      5      6      7      8
0123456789012345678901234567890123456789012345678901234567890...0

@RUN

@ASG,A WEATHER.

@USE 15.,WEATHER.

@ASG,T 2.

@ASG,A CSSG*RLLIB.

@XQT CSSG*RLLIB.RXBURN

first {
STATION
  ANY STATION      123456  2345 45 H 3 P 3 0615  T T  2  4500. 1
YEARS      1900  1978
DATES      0101  1215
}

directive {
ACTIVITY
  DEMONSTRATION OF MULTIPLE PRESCRIPTION ANALYSIS
}

block {
IDENTIFY
  LARRY BRADSHAW      FIRE LAB      MISSOULA
PRESCRIBE 01
  NFDRS  ERC      2      4      1  10
}

RUN
```

01

second { STATION  
SAME STATION 123456 2345 45 H 3 P 3 0615 T T 2 4500. 1  
directive { YEARS 1900 1978  
DATES 0101 1215  
block { PRESCRIBE 01  
NFDRS ERC 4 8 4 15  
RUN

---

01

third { PRESCRIBE 01  
directive { WIND SPEED 13 18 10 20  
block { RUN

---

01

fourth { PRESCRIBE 03  
directive { WIND DIRECTION D W S NW  
WIND SPEED 4 8 2 12  
block { MAX TEMPERATURE 65 72 60 78  
RUN

---

@EOF

@FIN

## Error Messages

1. No recognizable input cards - Incorrect input stream - Program Aborted.

Cause: Misspelled control word on a control card, or control card word not beginning in column 1.

2. At least one option is incorrect or was started in the wrong column - Program Aborted.

Cause: Misspelled option after the PRESCRIBE control card, or option card did not begin in column 6.

3. Difference between site and AFFIRMS station greater than 2000 feet, no adjustments made.

Cause: Self-explanatory.

## Output Quantities

For each station and/or prescription analysis in a single RXBURN run, approximately five pages of output are produced, with a maximum of nine for a full 12-month analysis.

## Cost Estimates

For a typical RXBURN run (one station, 5- to 6-month analysis, three to four prescription parameters) a user can expect costs and resource use as outlined below.

<u>Run priority</u>	<u>Cost</u>	<u>CAU (sec)</u>	<u>Resource time</u>
DEMAND	\$4.00 to \$5.00	8 to 9	10 to 11
L	\$2.00 to \$2.50	8 to 9	10 to 11
N	\$1.00 to \$1.50	8 to 9	10 to 11
P	\$0.75 to \$1.00	8 to 9	10 to 11

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1981. A computer system for scheduling fire use. Part II: computer terminal operator's manual. USDA For. Serv. Gen. Tech. Rep. INT-100, 34 p. Intermt. For. and Range Exp. Stn., Ogden, Utah 84401.

Provides program writeups, including input requirements, keypunch instructions, job control language, example of output, error messages, and cost estimates for two computer programs: RXWTHR and RXBURN. These programs comprise a system designed to aid in predicting the probable occurrence of desired prescribed fire weather conditions.

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KEYWORDS: prescribed fire, fire use plans, climatology, computer programs.

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1981. A computer system for scheduling fire use. Part II: computer terminal operator's manual. USDA For. Serv. Gen. Tech. Rep. INT-100, 34 p. Intermt. For. and Range Exp. Stn., Ogden, Utah 84401.

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KEYWORDS: prescribed fire, fire use plans, climatology, computer programs.

The Intermountain Station, headquartered in Ogden, Utah, is one of eight regional experiment stations charged with providing scientific knowledge to help resource managers meet human needs and protect forest and range ecosystems.

The Intermountain Station includes the States of Montana, Idaho, Utah, Nevada, and western Wyoming. About 231 million acres, or 85 percent, of the land area in the Station territory are classified as forest and rangeland. These lands include grasslands, deserts, shrublands, alpine areas, and well-stocked forests. They supply fiber for forest industries; minerals for energy and industrial development; and water for domestic and industrial consumption. They also provide recreation opportunities for millions of visitors each year.

Field programs and research work units of the Station are maintained in:

Boise, Idaho

Bozeman, Montana (in cooperation with Montana State University)

Logan, Utah (in cooperation with Utah State University)

Missoula, Montana (in cooperation with the University of Montana)

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